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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/622,511

07/21/2003

Osamu Shimamura

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Washington, DC 20005-3096

EXAMINER

LEE, CYNTHIA K

ART UNIT	PAPER NUMBER
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1795

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09/13/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/622,511	Applicant(s) SHIMAMURA ET AL.	
	Examiner CYNTHIA LEE	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,9-12,14-16,18 and 19 is/are pending in the application.
- 4a) Of the above claim(s) 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,9-12,14-16 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

This Office Action is responsive to the amendment filed on 12/1/2009. Claim 19 has been added. Claims 1-3, 9-12, 14-16, 18, 19 are pending. Claim 18 is withdrawn from further consideration as being drawn to a non-elected invention.

Applicant's arguments have been considered but are not persuasive. Claims 1-3, 9-12, 14-16, 19 are non-finally rejected for reasons stated herein below.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/5/2010 has been entered.

Claim Objections

Claim 19 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 1. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 9-12, 14-16, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibuya (US 6291098) in view of Murai (US 6444355), Takami (US 6544682), Yata (US 6902847), and Proctor (US 2381140).

Shibuya discloses a thin type cell (or a stack-type cell) comprising a positive electrode having a positive electrode active substance layer, a negative electrode having a negative electrode active substance layer, and a separator interposed between the positive electrode and the negative electrode, the positive electrode, the negative electrode and the separator being stacked in a stack direction to allow the positive electrode and the negative electrode, opposing to the positive electrode via the separator. See Fig. 1 and 3. The cell outer sheath is made from a laminate film composed of polymer and metal and welded to gas-tightly encapsulate the electric power generating element inside the cell outer sheath such that the cell is formed in a flat shape (8:31-35). It further consists a positive electrode terminal lead electrically conductive with the positive electrode and sandwiched between welded portions and extending to an outside of the cell outer sheath. The same applied for the negative electrode terminal lead. See fig. 2.

Shibuya does not disclose that the cell is mounted on an automobile. Shibuya discloses a secondary lithium ion battery. Yata teaches a lithium ion secondary battery that can be used for an electric vehicle (8:43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to mount the battery of Shibuya, as taught by Yata, for the benefit of powering an electric vehicle.

Shibuya discloses that the anode comprised coating the active material onto copper foil with a total thickness of 200 μm (8:1-30). Shibuya does not disclose the thickness of the nickel foil current collector. However, Takami discloses of using a copper foil current collector for the negative electrode with a thickness of 10 μm . It would have been obvious to one of ordinary skill in the art at the time the invention was made to make Shibuya's negative electrode current collector with a thickness of 10 μm because both Shibuya's and Takami's are wound batteries and for the benefit of keeping the thickness relatively low to keep the resistivity low.

Shibuya discloses that the cathode with an active material coated on an aluminum net current collector has a thickness of 130 μm . Shibuya does not disclose the dimensions of the aluminum net current collector, but Murai teaches that the current collector comprises aluminum net is $\sim 30\mu\text{m}$ in thickness (7:10-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make Shibuya's current collector of $\sim 30\mu\text{m}$ because it's commonly known in the art to use an aluminum current collector with this dimension to conduct current in a wound battery.

Although Shibuya does not disclose the thickness of the separator and the electrolyte, adding the thickness of the cell components, which include the sheath (89

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um), positive electrode (130 um), negative electrode (200 um), positive terminal (110 um), negative terminal (110 um), and dividing by the thickness of the positive and negative active material layer yields no greater than ~ 4 , which is well below 80. See 6:55-67-7:1-15. Thus, when one was to include the separator and the electrolyte thickness, the ratio would not be greater than 80. However, absent specific thickness of the separator and the electrolyte, it is obvious that one of ordinary skill in the art would form the separator and the electrolyte of comparable dimensions as the electrode and the terminal and thus, yielding a ratio not greater than 80.

Shibuya discloses that the ratio of the thickness of the cell divided by the thickness of the active substances is 3.64, and not equal to or greater than 10 and equal to or less than 80 (applicant's claim 1). However, Takami teaches that the positive electrode layer and the negative electrode layer each has a thickness between 10 um and 150um. Takami teaches that where the thickness of the electrode layer is set to fall within a range of between 10 um and 150 um, it is possible to improve the large discharge characteristics and the cycle life (4:25-35, 5:35-45). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make Shibuya's and Murai's battery with the electrode layer thickness between 10 and 150 um for the benefit of improving the cycle life of the battery, as taught by Takami. Making Shibuya's battery as modified by Murai with the active material thickness as taught by Takami would yield a ratio of the thickness of the cell by the thickness of the active substances as high as 36.4, thus meeting claim 1.

Shibuya modified by Takami and Murai results in the thickness of the anode active substance of 190 um and the thickness of the cathode substance of 100 um. Shibuya modified by Takami and Murai does not disclose that at least one of the thickness of the active substance layer is equal to or greater than 20 um and equal to or less than 80 um (applicant's claim 10). However, Takami teaches that where the thickness of the electrode layer is set to fall within a range of between 10 um and 150 um, it is possible to improve the large discharge characteristics and the cycle life (4:25-35, 5:35-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the thickness of the electrode active layers, hence varying the distance from the surface of the electrode to the separator, for the benefit of improving the cycle life of the battery.

Takami discloses that the thickness of the active material affects discharge characteristics, thus clearly teaching that the active material thickness is a result effective variable. It has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05. It has been held by the courts that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et. al., 33 CCPA 1250, 156 F.2d 239, 70 USPQ 412. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists, see MPEP 2144.05. Generally, differences in ranges will not support the patentability of subject matter encompassed

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by the prior art unless there is evidence indicating such ranges is critical. See MPEP 2144.05.

The dimensions of the sheath are 8 cm by 10 cm (applicant's claim 2). The discharge current of the cell is 0.25 mA/cm^2 for 10 weeks or $190 \text{ cm}^2/\text{Ah}$ (See fig. 16 and 9:5-10) (applicant's claim 3). The terminal leads are made from carbon, nickel, aluminum, copper, tungsten, stainless steel, iron, silver, gold, alloys thereof (4:1-5) (applicant's claim 9). Shibuya discloses that the cell outer sheath is made from a pair of laminate films (6:55-65) (applicant's claim 11).

Shibuya does not disclose that the value obtained by dividing a thickness of the electrode terminal lead along the stack direction by a sum of a total thickness of the electrode current collector in a cell is equal to or greater than 0.4 and equal to or less than 2.0 for positive and negative electrode (applicant's claim 1). However, Shibuya discloses that the thickness of each electrode terminal is 110 μm . The Shibuya modified by Murai would result in $\sim 30 \text{ }\mu\text{m}$ for the aluminum net (as stated above). Shibuya modified by Takami would result in $\sim 10 \text{ }\mu\text{m}$ for the copper foil (as stated above). Yata teaches a stack-type cell wherein several cells are stacked (fig 2). The Examiner notes that stacking multiple cells together is common in the battery art to increase the capacity. One of ordinary skill in the art would be motivated to stack several unit cells together, as taught by Yata, to increase the cell capacity, thus yielding a ratio as claimed by the applicants. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to connect several unit cells

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for the benefit of increasing the cell capacity, thus possessing the ratio of thickness of the terminal and the total of current collectors as claimed by the applicants. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. See MPEP 2144.05.

The cathode terminal dimensions are 5mm by 3mm (applicant's claim 1). Further, Shibuya discloses that the width and the length of the electrode terminals are matched to the shape of the cell. Preferably, the width and the length are selected so that the voltage generated across both ends of the electrode terminals used as cells will be not higher than 1/100 of the nominal voltage of the cell (5:25-30). Further, for preventing short-circuiting, the thickness of the electrode terminal may be set so as to be smaller than that of the sheath (4:49-51). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the electrode terminal dimensions in accordance with the sheath dimensions for the benefit of enclosing the terminal in the sheath. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. See MPEP 2144.05.

Shibuya does not disclose that the cell outer sheath is made from one sheet (applicant's claim 12). Shibuya discloses that the cell outer sheath is made from two sheets. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the cell sheath from one sheet instead of two sheets for the benefit of easier sealing.

Shibuya does not explicitly disclose that more than one cell is connected in series or parallel (applicant's claim 14). Shibuya discloses only one cell. However, this limitation substantially encompasses the two electrical connections known in the electrical field. Further, it's commonly known in the art to join several cells together for the benefit of increasing the output voltage or current. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add several cells and connect them in series or in parallel, depending on if the voltage or the current needs to be increased.

It is commonly practiced in the art that a bus bar is used to connect electrode terminal leads (applicant's claim 15). It is noted that the common knowledge is taken to be admitted prior art because applicant failed to traverse the examiner's assertion. See MPEP 2144.03 C.

It is further noted that when more than one cell is connected in series or on parallel, they are either stacked or positioned side by side (applicant's claim 16).

Shibuya as modified by Murai do not disclose that the cell is wound (applicant's claim 13). However, Takami discloses that the cell is wound. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to wind the cell components for the benefits of creating a higher energy density cell.

Shibuya modified by Murai, Takami, and Yata does not teach that the terminal leads are equal to or greater than 40% and less than 80% of a length of one side of the cell (Applicant's claim 1). Proctor teaches a battery having a terminal with a large surface area for heat dissipation (1:32-37). It would have been obvious to one of

ordinary skill in the art at the time the invention was made to vary the size of the battery terminal of Shibuya modified by Murai, Takami, and Yata, as taught by Proctor, for the benefit of providing good heat dissipation. Proctor clearly teaches that the size of the battery terminal is a result effective variable. It has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

Shibuya's positive and negative electrode terminals extend to the outside from opposing sides of the cell outer sheath (applicant's claim 1).

Response to Arguments

Applicant's arguments filed 8/5/2010 have been fully considered but they are not persuasive.

Applicant asserts that the Exhibit 1 in the Declaration shows a sharp increase in the electrode terminal lead temperature and that the increase is not linear, and therefore the result is unexpected. Applicant asserts that the present claims do not require that the ratio of the lead width to the cell width approach zero.

The Examiner respectfully disagrees. One cannot assert that results are unexpected solely because the increase performance is not linear. The Examiner notes that one would expect the electrode terminal temperature to decrease with larger terminal due to larger surface area for heat dissipation, whether the temperature decrease would be linear or non-linear. It is natural for the temperature to increase in a

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non-linear fashion as the ratio of the terminal lead width to the cell width decreases since there is less surface area for heat dissipation. Thus, Applicant's data are not unexpected.

It is noted that the ratio of the terminal lead width to the cell width 40-80% would have been obvious in light of Proctor's teachings.

Applicant asserts that the configuration and structure of wound cells and stack-type cells are very different. Applicant asserts that configuration and design differences, and the problems encountered when fabricating stack-type and wound cells teach away from the combination.

In response, it is noted that the teachings relied upon in Shibuya, Murai, Takami, Yata, and Proctor are not exclusive to the type of cells, whether it is a wound type cell or a stack type cell. Further, it is noted that the combination does not entail combining the stacking and the winding of the electrodes, and thus the combination is not taught away from prior art. For example, the current collector thickness and the dimensions of the active material pertain to all types of batteries, and not to the specific configuration of the cell.

Applicant asserts that the ratio of electrode terminal width to laminate width of Shibuya is 0.0625, which is much lower than the claimed range of 0.4 to 0.8 (Pg 9 of Response). Furthermore, Shibuya discloses that the voltage generated across both

ends of the electrode terminals used as cells is not higher than 1/100 of the nominal voltage of the cell, Thus, Shubuya doe snot suggest the claimed range of 0.4 to 0.8.

The Examiner reiterates that Proctor teaches a battery having a terminal with a large surface area for heat dissipation (1:32-37), thus clearly teaching that the size of the battery terminal is a result effective variable. It has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05. Further, it would be within the skill of an ordinary artisan to vary the size of Shibuya's terminal appropriately, in light of Proctor, to meet the voltage requirements of the cell.

Pertinent Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ovshinsky (US 6372377) (10:33-35).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Cynthia Lee/
Examiner, Art Unit 1795